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CASE REPORT

Laparoscopic heminephroureterectomy for urothelial carcinoma in a horseshoe kidney

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Abstract A 75-year-old man with gross hematuria for 10 months received a diagnosis of urothelial carcinoma in the left moiety of a horseshoe kidney. Laparoscopic heminephroureterectomy was performed smoothly and without perioperative complications. Preoperative computed tomography angiography was shown to be a valuable imaging modality for evaluating anatomical variations, and the laparoscopic approach was effective for managing malignancy in a horseshoe kidney.

1. Introduction

A horseshoe kidney is the most common renal fusion anomaly and occurs in 0.2–0.3% of the population.[1] Urothelial carcinoma (UC) of the upper urinary tract in a horseshoe kidney is extremely rare. According to our review of relevant literature, only a few studies have reported UC in a horseshoe kidney managed through a laparoscopic heminephroureterectomy. Herein, we present a case of UC in a horseshoe kidney managed through this technique.

2. Case Report

A 74-year-old man presented with complaints of gross hematuria ongoing for 10 months. Retrograde pyelography showed a filling defect in the left renal pelvis. Ureteroscopy revealed a papillary tumor in the left renal pelvis, and biopsy confirmed UC. Computed tomography (CT) angiography revealed a horseshoe kidney with four renal arteries supplying the left moiety of the horseshoe kidney (Figure 1). Moreover, 99mTc-MAG3 renal scintigraphy revealed a renal function of 72.1% and 27.9% for the right and left parts, respectively. After receiving a careful explanation of the treatment risks and benefits, the patient chose to undergo a laparoscopic heminephroureterectomy.

Under general anesthesia, the patient was placed in a modified flank position, with the left side elevated 30°. A 2-cm incision was made over the paramedian line at the level

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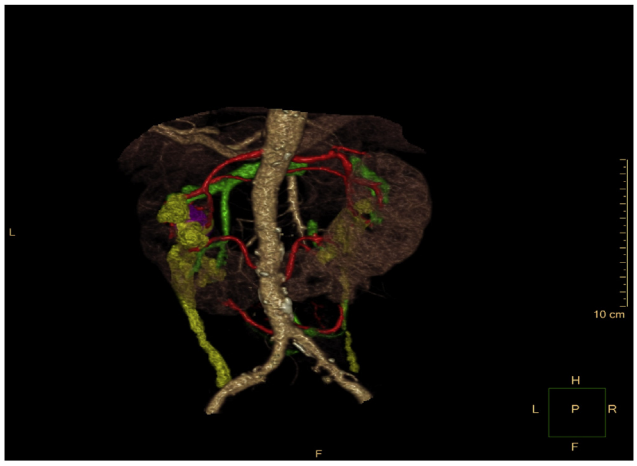

Figure 1 Reconstructed computed tomography angiography revealing a horseshoe kidney with four renal arteries supplying the left moiety of the horseshoe kidney from the posterior view.

of the umbilicus. The peritoneal cavity was entered and a 12-mm trocar was inserted. Pneumoperitoneum was created using carbon dioxide. Under direct laparoscopic vision, a 12-mm trocar was inserted on the ipsilateral midclavicular line, 3 cm below the costal margin and another 12-mm trocar was placed over the left Gibson incision line. Transperitoneal nephroureterectomy was performed. The renal arteries were ligated using Hem-O-Lok clips (Weck Surgical Instruments, Teleflex Medical, Durham, NC). Endo-GIA staplers (Covidien Inc, Mansfield, MA) were used to divide the renal vein and isthmus (Figure 2). Subsequently, open bladder cuff excision was performed through the Gibson wound. The surgical time was 210 minutes, and 200 mL of blood was lost. The patient resumed oral intake on Postoperative Day 1, and no perioperative complication was reported. He was discharged on Postoperative Day 4. Pathology revealed a pT3N0 UC in the left renal pelvis. No recurrent malignancy was observed over a 6-month follow-up period.

3. Discussion

Annually, UC affects 20 people/100,000 population, and 7–8% of UCs are located in the upper urinary tract.[2] In a review of tumors in horseshoe kidneys, renal cell carcinoma, UC, and Wilm's tumor accounted for 50%, 25%, and 25% of all cases, respectively.[3] UC occurs more frequently in horseshoe kidneys because of the greater susceptibility to urinary stasis, renal lithiasis, and urinary tract infection. Nephroureterectomy with bladder cuff resection is the standard treatment for UCs of the upper urinary tract. Two main challenges when conducting a laparoscopic hemi-nephroureterectomy in a horseshoe kidney are managing the complex renal arteries and performing an isthmusectomy. Conducting a preoperative imaging study is crucial for identifying complex vascular anatomy, understanding the extent of tumor invasion, and facilitating optimal surgical planning. In 2001, Lee et al[4] advocated three-dimensional multi-slice helical CT as the preferred imaging modality for clarifying tumors, vascular anatomy, and

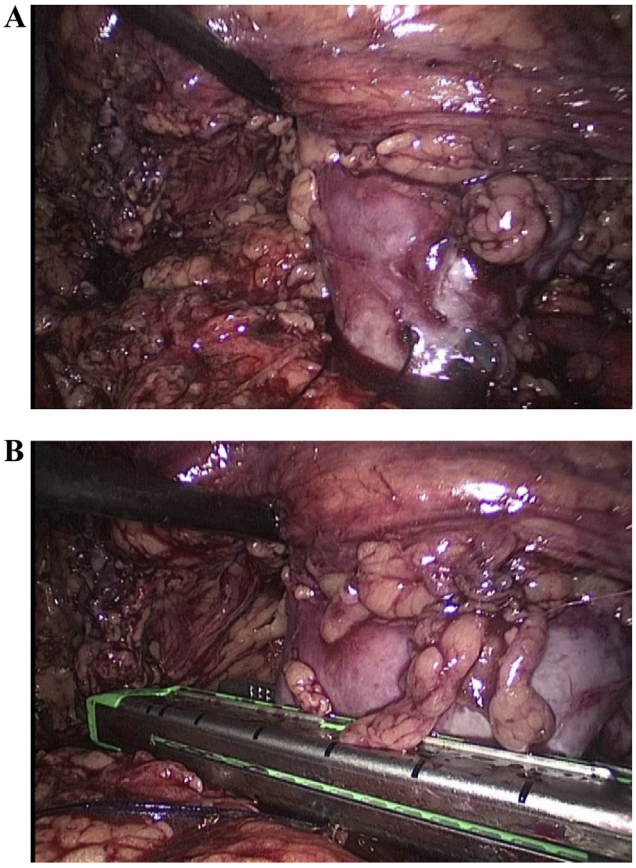

Figure 2 (A) Isthmus of the horseshoe kidney; (B) isthmusectomy performed using an Endo GIA stapling device (Covidien Inc, Mansfield, MA).

the collecting system of a horseshoe kidney. In a review of 209 cases with fused ectopia and a horseshoe kidney, CT was observed to be superior to magnetic resonance imaging and angiography in detecting arterial vessels.[5] In addition to the complex vasculature supplying each kidney, considerable variations may exist in the blood supply to the isthmus of a horseshoe kidney. After the supplying renal vessels have been ligated and transected, the isthmus margin can be clearly observed. This can also be achieved through preoperative embolization.[6] Complete mobilization of the kidney should be achieved before isthmusectomy, which can be performed using Endo GIA staplers, parenchymal sutures, electrocautery, or harmonic scalpels, depending on the preference of the surgeon and thickness of the renal isthmus.[7] Possible major complications of a laparoscopic nephrectomy include bleeding requiring conversion (1.4%), splenic injury (1.4%), a fragmented tumor (0.35%), kidney fracture during retrieval (0.35%), hypotension in the recovery room with re-exploration (0.35%), pneumothorax (0.35%), pulmonary embolus (0.35%), a Mallory–Weiss tear (0.35%), a bleeding duodenal ulcer (0.35%), and acute renal failure (0.35%).[8] Khan et al[7] reviewed 21 case reports (on a total of 25 patients) of laparoscopic nephrectomy for horseshoe kidney. They reported that perioperative surgical complications included paralytic ileus (4%), sick sinus syndrome (4%), a colonic serosal tear (4%), skin separation (4%), urinoma (4%), anejaculation

(4%), and neuralgia (4%). Additional large-scale studies are required in order to elucidate the actual complication rate of nephrectomy for horseshoe kidneys.

In conclusion, although technically challenging, the laparoscopic approach is a feasible alternative to conventional open surgery or robot-assisted laparoscopic surgery for managing malignancy in a horseshoe kidney.

References

1. Glenn JF. Analysis of 51 patients with horseshoe kidney. *N Engl J Med*. 1959;261:684—687.
2. Gupta R, Paner GP, Amin MB. Neoplasms of the upper urinary tract: a review with focus on urothelial carcinoma of the pelvicalyceal system and aspects related to its diagnosis and reporting. *Adv Anat Pathol*. 2008;15:127—139.
3. Buntley D. Malignancy associated with horseshoe kidney. *Urology*. 1976;8:146—148.
4. Lee CT, Hilton S, Russo P. Renal mass within a horseshoe kidney: preoperative evaluation with three-dimensional helical computed tomography. *Urology*. 2001;57:168.
5. Glodny B, Petersen J, Hofmann KJ, et al. Kidney fusion anomalies revisited: clinical and radiological analysis of 209 cases of crossed fused ectopia and horseshoe kidney. *BJU Int*. 2009;103:224—235.
6. Wilhelmsen S, Janitzky A, Porsch M, Liehr UB, Dudeck O. Value of preoperative superselective embolization of the isthmus in a patient with upper urinary tract urothelial carcinoma and horseshoe kidney. *Cardiovasc Intervent Radiol*. 2011;34(Suppl. 2):S98—S101.
7. Khan A, Myatt A, Palit V, Biyani CS, Urol D. Laparoscopic heminephrectomy of a horseshoe kidney. *JSLS*. 2011;15:415—420.
8. Simon SD, Castle EP, Ferrigni RG, et al. Complications of laparoscopic nephrectomy: the Mayo clinic experience. *J Urol*. 2004;171:1447—1450.